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APPENDIX V.

NOTES ON THE LITHOLOGICAL CHARACTER OF SOME OF THE ROCKS COL- LECTED IN THE YUKON DISTRICT AND ADJACENT NORTHERN PORTION OF BRITISH COLUMBIA.

BY MR. F. D. ADAMS, M.A.Sc.

(Of the rocks described below, Nos. 16, 25, 2, 4, 7 and 10 were collected by Mr. R. G. McConnell, "No. C." by Mr. W. Ogilvie, and the remaining specimens by Dr. G. M. Dawson.)

Stikine River, No. 16. (Near mouth of Clearwater River. See p. 55 B.)

Diabase Porphyrite.—A rock consisting of a fine-grained groundmass, through which crystals of plagioclase, augite and iron-ore are porphyritically distributed. The plagioclase individuals are well twinned and have good crystalline forms. The augite occurs in eight-sided crystals, both prisms being well developed, and the iron ore, which is ilmenite, partly decomposed to leucoxene. The groundmass is cryptocrystalline and microcrystalline. A good deal of chlorite and other decomposition products occurs disseminated through the rock.

Marsh Lake, No. 86. (North end of lake, near outlet. See p. 164 B.)

Diabase Porphyrite.—Resembles No. 16, but the porphyritic crystals are, as a general rule, smaller. The groundmass also, although for the most part microcrystalline, is in some places isotropic, consisting of glass.

Stikine River, No. 25. (Telegraph Creek. See p. 57 B.)

Diabase Tuff.—A somewhat fine-grained elastic rock a good deal decomposed, made up of irregular-shaped grains of plagioclase, pyroxene

and titanite iron ore, with a very little pyrite and some fragments of a fine-grained porphyritic rock. The majority of the grains are plagioclase, showing polysynthetic twinning, a few untwinned felspar grains are also present, some of which may be orthoclase. The plagioclase is a good deal decomposed, many grains consisting almost entirely of a crypto-crystalline or microcrystalline aggregate of calcite, kaolin and other decomposition products. The pyroxene is clear and colorless, being as a general rule less decomposed than the felspar. It is biaxial, and shows the usual pyroxene cleavages, with a high angle of extinction on the clinopinacoid, which in one case reached 41° . It is sometimes decomposed to chlorite, a considerable quantity of this mineral also occurring scattered through the rock. The fragments of titanite iron ore are for the most part decomposed to leucoxene, showing the characteristic cross-hatched structure. The fragments of fine-grained porphyritic rock above mentioned have a fine-grained groundmass, in which are imbedded lath-shaped crystals of plagioclase and crystals of augite, and are apparently pieces of a decomposed diabase porphyrite. Traversing the section are several bands or streaks, much finer in grain and showing cataclastic structure, and which were evidently lines of motion caused by crushing.

Dease Lake, No. 8. (About eight miles from head of lake, west shore, See p. 78 B.)

A very fine grained yellowish-green rock, with schistose structure and somewhat talcose appearance. Under the microscope it is seen to consist of an exceedingly fine-grained groundmass, almost opaque, in which are a few strings and irregular-shaped segregations of calcite and a number of porphyritic crystals of pyroxene. Under a very high power, the groundmass is seen to be composed largely of little shreds of a micaceous mineral, probably sericite, which are approximately parallel in position and give to the rock an appearance resembling flow structure. With this is associated a smaller quantity of a colorless mineral polarizing in dull bluish tints and with somewhat undulatory extinction, which resembles felspar, but does not show any lines of twinning. The pyroxene crystals are colorless. Cross sections are eight-sided, showing the development of both prism and pinacoids, with cleavages parallel to both and extinction parallel to the latter. It is biaxial, and longitudinal sections show a single set of cleavages, sometimes intersected by transverse cracks. The extinction direction makes an angle with this cleavage, which in one case was as high as 34° . The crystals are short and stout, and are occasionally twinned, they generally have good crystalline forms, but are sometimes broken

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A few grains of pyrite and a little chlorite are also present in the rock. As would be expected from the appearance of the hand specimen, the section shows that the rock has been subjected to a good deal of motion, two varieties of the rock differing somewhat in appearance, being irregularly mixed with one another. It is probably some *highly altered basic igneous rock*; the presence of the pyroxene crystals, retaining, as a general rule, their crystalline form, is however, somewhat remarkable.

Taqish Lake, No. 93. (Windy Arm. See p. 171 B.)

Felsite.—An exceedingly fine-grained rock, much crushed and altered. Small irregular-shaped segregations of calcite are scattered through the rock, and here and there little fragments of plagioclase can be seen. It is impossible by means of a section alone to determine its original character. Before the blowpipe it fuses easily to a black magnetic globule, and may provisionally be termed a *felsite*.

Cassiar Trail, No. 4. (Tooya River, at trail-crossing. See p. 70 B.)

Tuff?—An exceedingly fine-grained, red, somewhat schistose rock, holding numerous irregular-shaped cavities, filled with a light green chloritic mineral, mixed with calcite. The section is rendered nearly opaque by a dense impregnation with iron-oxide. It is also traversed by thin veins of calcite. Before the blowpipe the rock fuses to a black magnetic bead. It is probably an altered tuff.

GRANITIC ROCKS FROM THE COAST RANGES.

Wrangell, No. 2. (Wrangell Island. See p. 54 B.)

Biotite Granite.—A rather fine-grained gray granite, with very indistinct foliation. It is composed of quartz, orthoclase, plagioclase, biotite and epidote, with a very small amount of apatite and of an isotropic mineral, light brown in color, with high index of refraction, but without good crystalline form, and which is probably garnet. Almost every grain of quartz exhibits, between crossed nichols, an uneven extinction, showing that the rock has been submitted to pressure. Both the orthoclase and plagioclase are generally fresh. The epidote, which is present in considerable amount, is colorless, strongly doubly refracting, and is almost always associated with the biotite. It occurs in curiously corroded, somewhat elongated, prismatic crystals, with perfect cleavage parallel to the longest axis, the plane of the optic

axes being at right angles to this cleavage. The mode of occurrence of this epidote is very similar to that found in the mica-diorite from Stony Point, on the Hudson River, and described by Dr. George Williams (*American Journal of Science*, June, 1888).

Stikine River, No. 4. (Near mouth of river. See p. 54 B.)

A Porphyritic Biotite Hornblende Granite, approaching a Quartz Diorite in composition.—A medium-grained grey rock, with numerous small white porphyritic crystals. It is composed of quartz, plagioclase, orthoclase, biotite and hornblende. The porphyritic crystals are feldspar, which is almost invariably plagioclase. They possess a zonal structure, and contain numerous colorless inclusions heaped up toward the centres of the crystals. Some of them also contain inclusions of muscovite, which is probably a decomposition product. The quartz generally shows an uneven extinction, owing to pressure. The plagioclase preponderates largely over the orthoclase, but some untwinned grains have been referred to the latter species. The biotite and hornblende are intergrown with each other. Two or three grains showing granophyr structure are also seen in this section.

Stikine River, No. 7. (Moraine of Great Glacier. See p. 54 B.)

Biotite Hornblende Granite.—A rather coarse-grained grey granite, with very indistinct foliation. It is composed of quartz, orthoclase, plagioclase, biotite, hornblende, sphene and magnetite. The quartz shows a somewhat uneven extinction. Both feldspars often show zonal structure. The hornblende is about equal to the mica in amount, and only small quantities of sphene and magnetite are present. The latter is probably titaniferous.

Stikine River, No. 10. (Little Cañon. See p. 54 B.)

Biotite Granite.—A coarse-grained grey granite, poor in mica. The orthoclase, of which there is a very large amount, often shows an indistinct zonal structure. A small quantity of magnetite, or more probably ilmenite, with which a little sphene is associated, is also present. A crystal of zircon was observed in one of the mica grains. Although the rock has no foliation, it shows very distinct cataclastic structure, induced by great pressure. The constituent minerals are seen to have been much squeezed and twisted, the larger grains being often, around their edges, broken up into a very fine-grained mass. The mica also, which is in part decomposed to chlorite, has been in many places pulled apart into shreds.

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Upper Pelly

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GRANITIC ROCKS FROM THE INTERIOR RANGES.

Upper Pelly River, No. 61. (Near mouth of river. See p. 132 B.)

Muscovite Biotite Granite.—A medium-grained grey granite, with very indistinct foliation. It is composed of quartz, orthoclase, microcline, plagioclase, muscovite, biotite and epidote, with small amounts of garnet, sphene, pyrite and calcite. The plagioclase is present in relatively smaller amount than in the granites from the Coast Ranges. The muscovite is more plentiful than the biotite. The epidote occurs in colorless corroded crystals, and has the appearance of an original constituent of the rock. The garnet is reddish, and occurs in a few irregular-shaped isotropic grains, usually much cracked. The sphene occurs in the usual wedge-shaped crystals. The calcite is seen in the section in a few large grains. The grains of quartz and orthoclase are somewhat cracked and broken, but beyond this, no distinct evidence of pressure is exhibited by the section.

Upper Pelly River, No. 57. (Granite Cañon. See p. 130 B.)

Biotite Granite.—A rather coarse grained, much decomposed, massive grey granite. The feldspars are so decomposed that it is difficult to determine their character, but a considerable amount of plagioclase is present, and probably a still larger amount of orthoclase. The biotite is entirely decomposed to chlorite and epidote. A few small grains of hematite are present in the section. The quartz grains are much cracked, and show very uneven extinction, owing to the pressure to which the rock has been subjected.

Pelly or Yukon, "No. C." (Opposite Stewart River. See p. 34 B.)

Quartzite Biotite Gneiss.—A rather fine-grained red gneiss, showing very distinct foliation. It is composed of quartz, orthoclase, plagioclase, calcite, chlorite, ilmenite and a little pyrite. The plagioclase is present in rather small amount. The chlorite is a decomposition product, probably of biotite, and the calcite, of which there is a considerable quantity, is also a decomposition product. The ilmenite is partly altered to leucoxene. The cataclastic structure is distinctly seen in the section.

Upper Pelly River, No. 53. (Nine miles above Macmillan. See p. 129 B.)

Biotite Granite.—A rather coarse-grained, reddish-grey, massive rock, composed of quartz, orthoclase, plagioclase and chlorite, with a

little ilmenite and pyrite. Both feldspars are much decomposed, being in some places nearly opaque. The plagioclase, which is not so plentiful as the orthoclase, is generally better crystallized, and frequently occurs in crystals penetrating this mineral. The ilmenite is partly decomposed to leucoxene, and the chlorite is evidently a decomposition product of biotite. The section is traversed by a little very fine grained granitic vein, showing a banded structure parallel to its walls. The quartz has been much cracked, nearly every grain showing an uneven extinction.

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